(Lothar) Collatz conjecture in one variable confirmed as tautologous

From: blogs.ams.org/matheducation/2015/05/01/famous-unsolved-math-problems-as-homework/

> Given a positive integer n, if it is even, calculate n/2, otherwise if it is odd then calculate 3n+1; repeat this process with the resulting value. (1.1)

We assume the apparatus and method of Meth8/VŁ4 modal logic model checker. Meth8 allows to mix four logical values with four analytical values. The designated *proof* value is T.

Definition	Axiom	Symbol	Name	Meaning	2-tuple	Ordinal
1	p=p	T	Tautology	proof	11	3
2	p@p	F	Contradiction	absurdum	00	0
3	%p>#p	N	Non-contingency	truthity	01	1
4	%p<#p	C	Contingency	falsity	10	2

LET: ~ Not; + Or, addition; - Not Or, subtraction; & And, multiplication;
\ Not And, division; > Imply greater than; < Not Imply, less than;
= Equivalent; @ Not Equivalent; # necessity, for all; % possibility, for one or some.

The proof table in 16-values in row-major and presented horizontally.

(p>(p@p))>(((p=(%p<#p))>(p\(%p<#p)))+((p=(%p>#p))>((p&(p=p))+(%p>#p)))) ;
TTTT TTTT TTTT TTTT (1.2)

A more elaborate alternative proof uses two ordinal values as {0,1} to derive the four {3,0,1,2} and explicitly tests arity results based on 0 for even or 1 for odd, with iteration specified by the universal operator as applied to the single variable p in the antecedent.

p > zero, as tautologous: (p>((%p>#p)-(%p>#p))) = (r=r); TCTC TCTC TCTC TCTC (1.3.1)

p = even, as tautologous: ((((p-(p\(%p<#p)))&(%p<#p))=((%p>#p)-(%p>#p)))
>(p=(p\(%p<#p)))) = (r=r); CTCT CTCT CTCT CTCT (1.3.2)

p = odd, as tautologous: (~(((p-(p\(%p<#p)))&(%p<#p))=((%p>#p)-(%p>#p)))
>(p=((%p>#p)+(p&((%p>#p)+(%p<#p)))))) = (r=r) ; TTTT TTTT TTTT TTTT (1.3.3)

all instances of p > zero: #(p>((%p>#p)-(%p>#p))) > (((((p-(p\(%p<#p)))&(%p<#p))
=((%p>#p)-(%p>#p)))>(p=(p\(%p<#p)))) + (~(((p-(p\(%p<#p)))&(%p<#p))=((%p>#p)-
(%p>#p)))>(p=((%p>#p)+(p&((%p>#p)+(%p<#p))))))) ; TTTT TTTT TTTT TTTT (1.3.4)

Eq. 1.2 or 1.3.5 as rendered show the conjecture is confirmed as tautologous.

This is the briefest known such proof.